

NEW YORK REGIONAL ENERGY-WATER WORKSHOP

Planning Needs

After the participants identified energy-water issues facing New York, some planning and research needs were outlined and areas of research, development, demonstration and application identified.

- **Integrated Long-term Planning**

The need for integrated long-term planning was noted throughout the Workshop, both for the deregulated electric utilities and to address the energy-water nexus interdependencies. Some planning is being undertaken by city and state agencies now. For example, the New York State Energy Research and Development Authority (NYSERDA) has established a program to examine the energy efficiency of waste-water treatment systems and municipal water systems. The New York City Department of Environmental Protection (NYCDEP) has developed a plan that looks at both energy and water efficiency. In support of such planning efforts, the Columbia Earth Institute has an on-going research program to define potential future climate change impacts on the New York City metropolitan region, including Long Island. Brookhaven National Laboratory has an on-going research program to examine the system-wide energy and environmental impacts, including water, of existing and proposed energy technologies over a 25- to 50-year time horizon.

However, there is no overall integrated planning approach for water and energy interactions in New York State by the public officials responsible for water and energy planning.

Planning tools are needed to address the technically complex interactions between energy and water supply and demand. These tools would inform the decisions of the New York policy-makers and provide a common framework and language for on-going communication among the stakeholders involved.

Proposed Projects

- Develop and apply a New York-specific integrated energy, economic, environmental (EEE) technology-rich model to track the water requirements of energy-use technologies, and to quantify the energy supply and efficiency consequences of water treatment.
- Develop and apply tools to predict future climate change impacts on the availability of both energy and water.
- Create and test decision-support frameworks to enable water and energy planners to analyze energy and water security issues and the social consequences of alternative energy–water management scenarios.

- **Strengthen Financial Market Incentives**

The participants discussed several areas where financial markets might be used to guide future improvements in energy and water infrastructure projects.

Sarbanes-Oxley Act of 2002. The objective of the Sarbanes-Oxley Legislation is to protect investors by improving the accuracy and reliability of corporate disclosures made pursuant to the securities laws. Management must ensure that risks are identified and managed and that appropriate controls over these rules exist and are operating effectively. Complying with the risk management requirements of Sarbanes-Oxley could force attention to issues related to the energy-water nexus. For example, has the power plant adequately considered the risks related to sufficient water for cooling, and to the effluent impacts on water? Or, has the water utility looked at the future availability of the energy required to obtain and treat water?

Effective Market Pricing. Some of the price structures for energy and water are antiquated. Updating these structures along with instituting proper monitoring of use could encourage efficiencies in water and energy production, delivery, demand devices and use.

Identification of Investment Capital. The deregulated electric utility structure in New York has not only made long-term planning to meet future electricity needs difficult, but has forced some utilities close to or into bankruptcy. The investment required to bring a large project successfully to completion is considerable. Innovative ways are needed to foster an environment where investment sources are encouraged.

Proposed Projects

- Propose and analyze innovative market mechanisms to foster the adoption of water and energy conservation, water reuse and the creation and implementation of renewable energy technologies.
- Apply risk assessment tools to help water and energy facility management identify risks and propose appropriate controls as required by the Sarbanes-Oxley legislation.

Technology Research Needs

- **Update Aging Infrastructure**

Much of the existing infrastructure in New York is aging, energy-inefficient and wasteful of water. The investment in these assets is considerable. The aqueduct system is leaky, the steam system is old, the water-treatment plants have difficulty coping with both storm runoff and waste. This reality puts a premium on developing innovative ways to conserve land, energy and water in urban areas.

The participants noted some ideas like using grey water where possible, lowering the urban heat island effect by using green roofs and planting vegetation in and around existing structures, and exploring ways to store water in wet years for use in droughts. Innovative ideas must be solicited and tested.

Proposed Projects

- Create and integrate advanced technologies for energy generation, sewage treatment, and water purification to create self-sustainable communities or neighborhoods in the existing urban setting. Some examples include:
 - utilization of local generation to run water purification and sewage treatment facilities, and
 - more efficient utilization of local precipitation (e.g., green roofs).
 - more efficient and less costly desalination technologies,
 - technologies to utilize sewage treatment effluent,
- Propose alternatives for and analyze the risks and benefits of innovative water storage concepts for the New York metropolitan region.
- **Examine Water and Energy Issues Specific to Long Island**

The energy-water issues of Long Island are different in significant ways from those in New York City and the metropolitan areas to the north. Long Island is a heavily populated island completely surrounded by saltwater and dependent for its freshwater on underlying aquifers renewed by rainwater. New York City and areas to the north depend on surface water from reservoirs and rivers, with little aquifer withdrawal. Long Island also has few centralized water-treatment plants, relying mostly on decentralized cesspools and septic systems. Long Island also has among the highest electric power costs in the country and is constrained by relatively few connections to the off-island electricity transmission grids.

Proposed Projects

- Examine more efficient and less costly desalination technologies, perhaps co-located with distributed combined heat and power (CHP) plants.
- Explore technologies to minimize the impact of decentralized waste treatment systems on the underlying aquifers.
- Examine the increased use of decentralized power generation to minimize the environmental impacts on both freshwater and saltwater wetlands.
- **Re-examine Issues related to Power Plant and Water Treatment Facilities**

Siting new facilities in a densely built environment is difficult. One option to conserve land and use water more efficiently would be to co-locate new power generation and wastewater treatment facilities. This would enable use of the effluent of the wastewater treatment facility to provide some of the required

cooling water for the power plant. Other ways to cool power plants efficiently while meeting strict environmental standards in an economic way are needed to meet strict federal and state environmental rules and to lessen the investment risk of new projects.

Proposed Projects

- Examine the potential to co-locate water treatment facilities and power plants in southeastern New York. Analyze both technical and regulatory aspects.
 - Increase understanding of environmental impacts of different power plant cooling systems on both freshwater and saltwater environments.
 - Create and test new power-plant cooling technologies that decrease fresh water use while minimizing power loss.
- **Encourage Alternative Power Generation**

Governor Pataki has mandated that New York State must meet 25% of its in-state electricity generation by green technology by 2013. This target will help New York meet its environmental goals while lessening the State's dependence on imported oil, a desirable energy security objective. However, the full set of water implications of green technologies must be considered, beyond a sole focus on hydropower requirements, and factored into long-term planning.

Proposed Projects

- Create and test innovative renewable energy technologies.
- Increase understanding of environmental impacts and water requirements of renewable technologies.
- Determine the potential to use NYC aqueducts to create hydropower.

Next Steps

Following the Workshop, the sponsors from Brookhaven National Laboratory, Columbia Earth Institute, and the Electric Power Research Institute met to discuss what had emerged from the Workshop discussions, and defined what the next steps might be. These include:

- Develop specific research proposals with New York stakeholders, including (as the project requires) industry, NGOs, universities, research institutes and government laboratories. Initial proposals will concentrate on developing project ideas proposed as a result of the Workshop discussions.

- Where appropriate technology exists, propose projects to demonstrate how to improve energy and water efficiency in a dense, aging urban environment. Some examples are:
 - Demonstration Project on green roofs and energy and water use in an existing urban neighborhood.
 - Demonstration of green and distributed energy projects that conserve freshwater and treat impaired water.
- Move toward developing a truly integrated energy-water planning process in New York, supported by the tools necessary for public and private planners.
 - Incorporate water requirements of energy technology and present and proposed water-treatment technology in an integrated energy technology, environmental, economic decision-support model, such as the BNL MARKAL model, for use by New York and northeast regional policymakers concerned with integrated energy-water planning.
 - Propose policy research on streamlining regulatory requirements for siting new electric power and wastewater-treatment facilities, including use of innovative financial incentives in the deregulated environment.
 - Examine the economic, energy and environmental tradeoffs of power plant cooling technologies, including dry cooling, closed-cycle cooling, once-through cooling and use of impaired water as the coolant.
- Establish a Regional Center and Stakeholder Advisory Group to define, guide and carry-out future energy-water research and technology transfer.